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PATENT

Practitioner's Docket No. 1062-03

IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

In re application of: Myron J. Maurer

Application No.: 10/799,095

Filed: 03/12/2003

For: IMPACT ABSORPTION STRUCTURE

Group No.: 3683

Examiner: Torres, Melanie

Mail Stop Appeal Briefs – Patents

Commissioner for Patents

P.O. Box 1450

Alexandria, VA 22313-1450

TRANSMITTAL OF APPEAL BRIEF
(PATENT APPLICATION--37 C.F.R. § 41.37)

1. Transmitted herewith, in triplicate is the APPEAL BRIEF in this application, with respect to the Notice of Appeal filed on December 12, 2005. A Pre-Appeal Brief Request for Review was submitted concurrently with the Notice of Appeal. On January 30, 2006 a notice of panel decision indicated that the appeal should proceed to the Board for decision. The time for filing the Appeal Brief was reset to February 28, 2006. No fee is believed due at this time.

2. STATUS OF APPLICANT

This application is on behalf of other than a small entity.

CERTIFICATION UNDER 37 C.F.R. §§ 1.8(a) and 1.10*

(When using Express Mail, the Express Mail label number is mandatory;
Express Mail certification is optional.)

I hereby certify that, on the date shown below, this correspondence is being:

MAILING

G deposited with the United States Postal Service in an envelope addressed to the Commissioner for Patents, P.O. Box 1450, Alexandria, VA 22313-1450.

37 C.F.R. § 1.8(a)

G with sufficient postage as first class mail.

37 C.F.R. § 1.10*

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G facsimile transmitted to the Patent and Trademark Office, (571) 273 - 8300.

Roni L. Masquelier
Signature

Date: 02-27-06

Roni L. Masquelier
(type or print name of person certifying)

* Only the date of filing (' 1.6) will be the date used in a patent term adjustment calculation, although the date on any certificate of mailing or transmission under ' 1.8 continues to be taken into account in determining timeliness. See ' 1.703(f). Consider "Express Mail Post Office to Addressee" (' 1.10) or facsimile transmission (' 1.6(d)) for the reply to be accorded the earliest possible filing date for patent term adjustment calculations.

3. FEE FOR FILING APPEAL BRIEF

Pursuant to 37 C.F.R. § 41.20(b)(2), the fee for filing the Appeal Brief is:

other than a small entity \$500.00

Appeal Brief fee due \$500.00

4. EXTENSION OF TERM

The proceedings herein are for a patent application and the provisions of 37 C.F.R. § 1.136 apply.

The total fee due is:

Appeal brief fee \$500.00

Extension fee (if any) \$0.00

TOTAL FEE DUE \$500.00

5. FEE PAYMENT

Authorization is hereby made to charge the amount of \$500.00 to Deposit Account No. 04-1512.

6. FEE DEFICIENCY

If any additional extension and/or fee is required, and if any additional fee for claims is required, charge Deposit Account No. 04-1512.

Date: February 27, 2006



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Practitioner's Docket No. 1062-033 (63264)

PATENT

IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

In re application of: Myron J. Maurer

Application No.: 10/799,095

Group No.: 3683

Filed: March 12, 2003

Examiner: Torres, Melanie

For: IMPACT ABSORPTION STRUCTURE

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APPEAL BRIEF

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The Real Party in Interest

The application is assigned to Dow Global Technologies, Inc., which is a subsidiary of The Dow Chemical Company.

Related Appeals and Interferences

There are no other proceedings involving this application.

Status of Claims

Claims 1, 3-10, 13-29, 32 and 33 are rejected under 35 U.S.C. §103(a) as being unpatentable over U.S. Patent No. 4,852,704 to Brockenbrough et al. ("Brockenbrough").

Status of Amendments

Amendments submitted on September 12, 2005, after the final rejection, were entered.

A Request for Pre-Appeal Brief Review was submitted on December 12, 2005. The Review Panel decision was to proceed to the Board of Patent Appeals and Interferences in a notice mailed on January 30, 2005. The time period for filing this Appeal Brief was reset to one month from the mailing of the Notice i.e. February 28, 2006.

Summary of Claimed Subject Matter

The invention of claims 9, 17 and 23 is an article of manufacture or an energy absorbing structure with two layers of material. (paragraph [0012], second sentence; paragraph [0038], second sentence; and Figures 4A-4E, 5A and 5B). Each layer includes surface features such as protrusions or corrugations that nest within each other. (paragraph [0012], second sentence and paragraph [0013], first sentence). Extruded plastics may be used as the materials for each layer. (paragraph [0032], first sentence and (paragraph [0034], first sentence). The materials in the layers differ from one another in their composition. (paragraph [0038], second to last sentence; paragraph [0041]; and Figure 4B).

The invention of claim 1 is an article of manufacture with two pluralities of corrugations on a layer of material separated by a hinge. (paragraph [0052]; Figures 5A and 5B; and claims 2 and 3 as originally filed). The invention of claim 28 is a method of manufacturing an energy absorber which includes actuating a hinge that separates the two pluralities of surface features to nest the surface features within one another. (paragraph [0052], second sentence; claims 3 and 28 as originally filed; and Figure 5A and 5B). The invention of claim 29 is a method of manufacturing an energy absorber by extruding a layer of material with two pluralities of surface features separated by a hinge. (paragraph [0033], first sentence, paragraph [0052]; and claim 29 as originally filed).

The invention of claims 7, 15 and 21 is an article of manufacture or an energy absorbing structure that has frictional energy dissipation during an impact. (paragraph [0038], last sentence; paragraph [0039], last sentence; paragraphs [0043]-[0045]; and claims 7, 15 and 21 as originally filed).

Grounds of Rejection to be Reviewed on Appeal

Whether claims 17 and claim 23 are patentable under 35 U.S.C. §103 over Brockenbrough.

Whether claims 1, 28 and 29 are patentable under 35 U.S.C. §103 over Brockenbrough.

Whether claims 7, 15 and 21 are patentable under 35 U.S.C. §103 over Brockenbrough.



Argument

Rejection under 35 U.S.C. §103(a) over U.S. Patent No. 4,852,704 to Brockenbrough et al.

Claims 9, 17 and 23: Claims Including Two Different Materials

The Examiner rejected claims 17¹ and 23 as obvious over U.S. Patent No. 4,852,704 to Brockenbrough et al. ("Brockenbrough"). Claim 9 also contains this limitation but was not specifically rejected by the Examiner. In this rejection, the Examiner fails to establish a *prima facie* case of obviousness by failing to identify where in the prior art each element of the claim is found and by erroneously placing the burden on the Applicants.

The Examiner's rejection from page 3 of the Final Office Action is reproduced here:

Re claims 17, 23, 24-28, Brockenbrough et al. does not teach wherein the first and second layers differ in composition. It would have been obvious to one of ordinary skill in the art at the time of the invention was made to have provided the first and second layers of different composition since the applicant has not disclosed that having different compositions solves any stated problem or is for any particular purpose and it appears that the invention would perform equally well with a variety of different compositions such as metal or plastic.²

In response to Applicants' previous arguments regarding this rejection, the Examiner states on page 4 of the Final Office Action:

Further, it has been held that it is within the general skill of a worker in the art to select a known material on the basis of its suitability for the intended use as a matter of obvious design choice (In re Leshin, 125 USPQ 416).

This rejection fails to establish a *prima facie* case because the Examiner does not identify where in the prior art where each element of the claim is found. By the Examiner's own admission the cited prior art does not teach the use of differing compositions in the first and second layers of the article of manufacture (claim 17) or energy absorbing structure (claim 23).

The law is clear: a *prima facie* case of obviousness requires that the Examiner identify each and every element of the claimed invention in the prior art; failure to do so means that the Examiner has not made a *prima facie* case of obviousness. In re Royka, 490 F.2d 981, 180 USPQ 580 (CCPA 1974).

The Examiner attempts to rehabilitate the rejection by shifting the burden to the Applicants. The Examiner states that the Applicants have not disclosed that having different compositions in the energy absorber solves any stated problem or is for any

¹ Claim 17 currently depends on claim 12, a cancelled claim; the claim should depend from claim 10.

² This rejection was repeated from the first Office Action mailed on January 14, 2005.

particular purpose. However, the burden does not lie with the Applicants to provide such information because the Examiner has not shown where in the prior art that element of the claim is found. In re Oetiker, 977 F.2d 1443, 24 USPQ2d 1443 (Fed. Cir. 1992)(the examiner bears the initial burden, on review of the prior art or on any other ground, of presenting a *prima facie* case of obviousness).

Notwithstanding the error of the Examiner shifting the burden, the Applicants do state a benefit for the use layers having different compositions. First, as seen in paragraph [0041] of the application, Applicants disclose that in one embodiment, the layers may have different impact strengths as a result of the different materials used for the layers:

[0041] The second aspect of the multi-layer absorber with differing materials is shown in cross-section in Fig. 4B. Here, the first layer 220 includes corrugations 242 (or protrusions) into which are nested the corrugations 224 of the second layer 246 where the material of first corrugations differs from the material of the second corrugations. In this embodiment, the corrugations may be sized and shaped so that there is no appreciable space between the floors 228 and 230 of the two corrugations. The materials of the corrugations differ in their compositions and consequently their impact strength. In a preferred aspect, the first layer has a lower impact strength than the second layer. In a preferred embodiment, the differing materials of the corrugation may be combined with surface features having different structures e.g. different wall thickness. (emphasis added).

This is followed by an example where a two layer energy absorber is compared to a known foam energy absorber via computer simulation. One of the predicted results is improved performance of the energy absorber where the layers have different impact strengths, as seen in paragraph [0060]:

[0060] Thus, a double layer conical structure comprised of 24 mm PS sheet being forced into a 19 mm PE sheet exhibits approximately 8% higher HIC(d) values than Strandfoam EA 1000, respectively. In addition, the data also demonstrates that forcing a weaker (e.g. taller) sheet into a stiffer (e.g. shorter) sheet improves normalized impact performance approximately 25% with the same weight. (Emphasis added).

This conclusion, combined with the teaching of paragraph [0041], teaches the benefits of a two layer energy absorber. Namely, that improved performance could be obtained by making the layers have different impact strengths. This teaching is not diminished because the example pertains explicitly to layers having different height surface features. The conclusion is clear that it pertains generally to situations where the layers have different impacts strengths, whether due to different materials, different surface feature heights, or different wall thicknesses (see paragraph [0040]).

Thus, even if the Examiner is permitted to shift the burden to the Applicants and require that the Applicants show the purpose of the claim element, Applicants have met the burden. In particular, Applicants have shown a benefit to differing materials in the energy absorber. Brockenbrough does not teach or suggest that any benefit from the use of layers having different impact strengths or other characteristics.

Further, the Examiner states that material selection is a matter of design choice. Even if the general supposition of the Examiner is true, the supposition does not apply here. In particular, claims 17 and 23 are not merely directed to a specific material (e.g. polypropylene) for use in an energy absorber. Rather, the claims 17 and 23 are directed to an energy absorber that comprises at least two layers with different materials. Thus, this is not the situation where a material selection is being made. Rather it is a situation where the relationship between two aspects of the claimed invention is being further defined. Namely, the composition of one layer is being distinguished from a second layer. For at least these reasons, the Examiner has failed to make a *prima facie* case of obviousness and withdrawal of the rejection is requested.

Claims 1, 28 and 29: Claims Including a Hinge

The Examiner also rejected claims 1, 28 and 29 as obvious over Brockenbrough.³ In this rejection, the Examiner fails to establish a *prima facie* case of obviousness by failing to identify where in the prior art each element of the claim is found. In particular, the Examiner fails to identify where in the prior art a 'hinge' is disclosed.

The Examiner never addresses the hinge element in the first Office Action or the Final Office Action even though the element is found in four different claims in the original claim set. The Examiner addresses the hinge element for the first time in the Advisory Action mailed September 28, 2005. In the Advisory Action, the Examiner states that: "Element 17 of Brockenbrough et al. can clearly be interpreted as a 'hinge'".

However, the Examiner's use of the word 'hinge' to describe element 17 is not warranted. A skilled artisan, after reviewing the specification of Brockenbrough, would not understand (much less interpret) the item denoted by reference numeral 17 to be the same or equivalent to a hinge. Indeed, a skilled artisan would understand reference numeral 17 to denote something that has the opposite functionality of a hinge.

The item at reference numeral 17 is described in Brockenbrough as:

a pair of brackets 17 (FIG. 1) and 18 (FIG. 2) for securing opposed narrow ends of the strips together. The brackets are secured to vertical posts of a vehicle door one of which is partially illustrated at 22 in FIG. 1. (column 3, line 1-5).

The brackets are further described as:

Brackets 17 and 18 are stiffer and generally thicker than the strips. Tabs 34 and 36 of each bracket are bent over as shown in FIG. 3a so as to secure the ends of the strips. (column 3, lines 35-38).

A bracket for securing together several components cannot be considered the same as a hinge. This rises to the level of an error in fact on the part of the Examiner.

This error in fact is compounded by the Examiner in the rejection of the method claims. The bracket 17 of Brockenbrough does not teach or suggest actuating a hinge to

³ Although the rejection was titled as based only on Brockenbrough, the body of the rejection mentions U.S. Patent No. 5,011,642 to Welygan. No mention of Welygan is made other than concerning extrusion.

manufacture an energy absorber (as in claim 28). Further, the bracket 17 of does not teach or suggest the extruding a layer of material with surface features separated by a hinge. As above, the bracket 17 conveys an opposite connotation to a skilled artisan then the one ascribed to it by the Examiner.

The same reasoning applies to the claims dependent from claim 1 and 29; namely claims 3-9 and claims 32 and 33, respectively. For at least these reasons, the Examiner has failed to make a *prima facie* case of obviousness and withdrawal of the rejection is requested.

Claims 7, 15 and 21: Claims Including the Use of Friction

The Examiner also rejected claims 7, 15 and 21 as obvious over Brockenbrough.⁴ In this rejection, the Examiner fails to establish a *prima facie* case of obviousness by failing to identify where in the prior art each element of the claim is found. In particular, the Examiner fails to identify where in the prior art where friction, as means of impact energy dissipation, is disclosed.

The Examiner never directly addresses the friction element in her rejection, thus making it difficult for the Applicants to respond. Again it appears that the Examiner is attempting to shift the burden to the Applicants, when in fact the Examiner has failed to meet her burden of identifying where in the prior art the use of friction to dissipate impact energy is disclosed.

Further, Applicants test for the effect of friction through a computer simulation by comparing energy absorbers that include a lubricant between the layers, as seen in paragraphs [0061] and [0062], and Table 2:

[0061] In another series of experimental tests, the effect of friction was investigated using CAE. Experimental tests on double layer conical structures with a 5 mm offset distance give the following results (utilizing structures such as seen in Fig. 3):

Table 2

Description	Comments	Total Thickness	HIC(d)
24 mm PS->24 mm PS	Control	29	510
24 mm PS->24 mm PS	Control	29	535
24 mm PS->24 mm PS	Lubricated cones	29	557
24 mm PS->24 mm PS	Lubricated cones	29	583

[0062] Thus, the data demonstrates that the frictional dissipation provided by a 5 millimeter offset improves head impact protection by approximately 10% versus similar samples with a lubricating agent.

⁴ Again, the rejection was titled as based only on Brockenbrough, but the body of the rejection mentions U.S. Patent No. 5,011,642 to Welygan. No mention of Welygan is made other than concerning extrusion.

Brockenbrough does not teach or suggest that any benefit from the use of friction to dissipate impact energy.

The same reasoning applies to the claims dependent from claim 7, 15 and 21; namely, claims 8, 16 and 22, respectively. For at least these reasons, the Examiner has failed to make a *prima facie* case of obviousness and withdrawal of the rejection is requested.

Conclusion

In view of Applicants' remarks, the Examiner's rejections are believed to contain clear error. Accordingly, Applicants submit that the present application contains allowable subject matter and is in condition for allowance. Should the Appeal Board or the Examiner have any question or wish to further discuss this application, Applicants request that the undersigned be contacted at (248) 292-2920.

If for some reason Applicants have not requested a sufficient extension and/or have not paid a sufficient fee for this response and/or for the extension necessary to prevent the abandonment of this application, please consider this as a request for an extension for the required time period and/or authorization to charge Deposit Account No. 04-1512 for any fee which may be due.

Date: February 27, 2006



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Claims Appendix

1. An article of manufacture, comprising:
an energy absorber comprising an extruded plastic first layer having a first plurality of corrugations separated by a hinge from a second plurality of corrugations, wherein the length of the corrugations are longer than their widest cross-sectional width.
2. (Canceled)
3. The article of claim 1, wherein individual corrugations of the first plurality are nested within individual corrugations of the second plurality after actuation of the hinge.
4. The article of claim 3, wherein the first and second pluralities of corrugations differ from each other in at least one structural or compositional aspect.
5. The article of claim 4, wherein the at least one structural aspect is selected from height, base width, floor width, average width, cross-sectional shape, base layer thickness, wall thickness, floor thickness and combinations thereof.
6. The article of claim 5, wherein cross-sectional shape is selected from square waveform, positive draft, negative draft, sinusoidal waveform, open loop shape, closed loop shape and combinations thereof.
7. The article of claim 5, wherein the differing structural aspect results in frictional energy dissipating during an impact.
8. The article of claim 7, wherein the differing structural aspect is depth.
9. The article of claim 4, wherein the first and second pluralities differ in composition.

10. An article of manufacture, comprising:
an energy absorber comprising an extruded plastic first layer having a first plurality of corrugations and an extruded plastic second layer having a second plurality of corrugations and wherein individual corrugations of the first plurality are nested within individual corrugations of the second plurality and wherein the first and second layers differ from each other in at least one structural or compositional aspect.
11. (Cancelled)
12. (Cancelled)
13. The article of claim 10, wherein the at least one structural aspect is selected from height, base width, floor width, average width, cross-sectional shape, base layer thickness, wall thickness, floor thickness and combinations thereof.
14. The article of claim 13, wherein cross-sectional shape is selected from square waveform, positive draft, negative draft, sinusoidal waveform, open loop shape, closed loop shape and combinations thereof.
15. The article of claim 13, wherein the differing structural aspect results in frictional energy dissipating during an impact.
16. The article of claim 15, wherein the differing structural aspect is depth.
17. The article of claim 12, wherein the first and second layers differ in composition.
18. An energy absorbing structure, comprising:
a energy absorber comprising a first plastic layer having a first plurality of surface features and a second plastic layer with a second plurality of surface features wherein the surface features of one layer are nested within the surface features of the other

layer and wherein the first and second layers differ from each other in at least one structural or compositional aspect.

19. The article of claim 18, wherein the at least one structural aspect is selected from height, base width, floor width, average width, cross-sectional shape, base layer thickness, wall thickness, floor thickness and combinations thereof.

20. The article of claim 19, wherein cross-sectional shape is selected from square waveform, positive draft, negative draft, sinusoidal waveform, open loop shape, closed loop shape and combinations thereof.

21. The article of claim 19, wherein the differing structural aspect results in frictional energy dissipating during an impact.

22. The article of claim 21, wherein the differing structural aspect is depth.

23. The article of claim 18, wherein the first and second layers differ in composition.

24. A method of manufacturing an energy absorber, comprising:
nesting individual surface features of a first plurality of surface features on a first plastic layer into individual surface features of a second plurality of surface features on a second plastic layer, wherein the first and second layers differ from each other in at least one structural or compositional aspect.

25. The method of claim 24, further comprising extruding a first layer comprising the first plurality of surface features.

26. The method of claim 25, further comprising extruding a second layer comprising the second plurality of surface features.

27. The method of claim 24, further comprising extruding a first layer comprising the first and second plurality of surface features.

28. The method of claim 27, wherein the nesting step comprises actuating a hinge that separates the first plurality and second plurality of surface features.

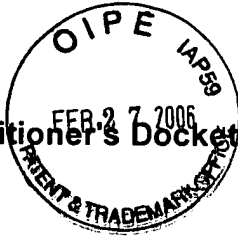
29. A method of manufacturing an energy absorber, comprising:
extruding a first layer comprising a first and a second plurality of surface features, wherein the first and second plurality of surface features are separated by a hinge.

30. (Cancelled)

31. (Cancelled)

32. The method of claim 29, further comprising nesting individual surface features of the first plurality of surface features into individual surface features of the second plurality of surface features.

33. The method of claim 32, wherein the first and second plurality of surface features are formed with at least one differing structural or compositional aspect.



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The invention of claims 9, 17 and 23 is an article of manufacture or an energy absorbing structure with two layers of material. (paragraph [0012], second sentence; paragraph [0038], second sentence; and Figures 4A-4E, 5A and 5B). Each layer includes surface features such as protrusions or corrugations that nest within each other. (paragraph [0012], second sentence and paragraph [0013], first sentence). Extruded plastics may be used as the materials for each layer. (paragraph [0032], first sentence and (paragraph [0034], first sentence). The materials in the layers differ from one another in their composition. (paragraph [0038], second to last sentence; paragraph [0041]; and Figure 4B).

The invention of claim 1 is an article of manufacture with two pluralities of corrugations on a layer of material separated by a hinge. (paragraph [0052]; Figures 5A and 5B; and claims 2 and 3 as originally filed). The invention of claim 28 is a method of manufacturing an energy absorber which includes actuating a hinge that separates the two pluralities of surface features to nest the surface features within one another. (paragraph [0052], second sentence; claims 3 and 28 as originally filed; and Figure 5A and 5B). The invention of claim 29 is a method of manufacturing an energy absorber by extruding a layer of material with two pluralities of surface features separated by a hinge. (paragraph [0033], first sentence, paragraph [0052]; and claim 29 as originally filed).

The invention of claims 7, 15 and 21 is an article of manufacture or an energy absorbing structure that has frictional energy dissipation during an impact. (paragraph [0038], last sentence; paragraph [0039], last sentence; paragraphs [0043]-[0045]; and claims 7, 15 and 21 as originally filed).

Grounds of Rejection to be Reviewed on Appeal

Whether claims 17 and claim 23 are patentable under 35 U.S.C. §103 over Brockenbrough.

Whether claims 1, 28 and 29 are patentable under 35 U.S.C. §103 over Brockenbrough.

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Argument

Rejection under 35 U.S.C. §103(a) over U.S. Patent No. 4,852,704 to Brockenbrough et al.

Claims 9, 17 and 23: Claims Including Two Different Materials

The Examiner rejected claims 17¹ and 23 as obvious over U.S. Patent No. 4,852,704 to Brockenbrough et al. ("Brockenbrough"). Claim 9 also contains this limitation but was not specifically rejected by the Examiner. In this rejection, the Examiner fails to establish a *prima facie* case of obviousness by failing to identify where in the prior art each element of the claim is found and by erroneously placing the burden on the Applicants.

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Re claims 17, 23, 24-28, Brockenbrough et al. does not teach wherein the first and second layers differ in composition. It would have been obvious to one of ordinary skill in the art at the time of the invention was made to have provided the first and second layers of different composition since the applicant has not disclosed that having different compositions solves any stated problem or is for any particular purpose and it appears that the invention would perform equally well with a variety of different compositions such as metal or plastic.²

In response to Applicants' previous arguments regarding this rejection, the Examiner states on page 4 of the Final Office Action:

Further, it has been held that it is within the general skill of a worker in the art to select a known material on the basis of its suitability for the intended use as a matter of obvious design choice (In re Leshin, 125 USPQ 416).

This rejection fails to establish a *prima facie* case because the Examiner does not identify where in the prior art where each element of the claim is found. By the Examiner's own admission the cited prior art does not teach the use of differing compositions in the first and second layers of the article of manufacture (claim 17) or energy absorbing structure (claim 23).

The law is clear: a *prima facie* case of obviousness requires that the Examiner identify each and every element of the claimed invention in the prior art; failure to do so means that the Examiner has not made a *prima facie* case of obviousness. In re Royka, 490 F.2d 981, 180 USPQ 580 (CCPA 1974).

The Examiner attempts to rehabilitate the rejection by shifting the burden to the Applicants. The Examiner states that the Applicants have not disclosed that having different compositions in the energy absorber solves any stated problem or is for any

¹ Claim 17 currently depends on claim 12, a cancelled claim; the claim should depend from claim 10.

² This rejection was repeated from the first Office Action mailed on January 14, 2005.

particular purpose. However, the burden does not lie with the Applicants to provide such information because the Examiner has not shown where in the prior art that element of the claim is found. In re Oetiker, 977 F.2d 1443, 24 USPQ2d 1443 (Fed. Cir. 1992)(the examiner bears the initial burden, on review of the prior art or on any other ground, of presenting a *prima facie* case of obviousness).

Notwithstanding the error of the Examiner shifting the burden, the Applicants do state a benefit for the use layers having different compositions. First, as seen in paragraph [0041] of the application, Applicants disclose that in one embodiment, the layers may have different impact strengths as a result of the different materials used for the layers:

[0041] The second aspect of the multi-layer absorber with differing materials is shown in cross-section in Fig. 4B. Here, the first layer 220 includes corrugations 242 (or protrusions) into which are nested the corrugations 224 of the second layer 246 where the material of first corrugations differs from the material of the second corrugations. In this embodiment, the corrugations may be sized and shaped so that there is no appreciable space between the floors 228 and 230 of the two corrugations. The materials of the corrugations differ in their compositions and consequently their impact strength. In a preferred aspect, the first layer has a lower impact strength than the second layer. In a preferred embodiment, the differing materials of the corrugation may be combined with surface features having different structures e.g. different wall thickness. (emphasis added).

This is followed by an example where a two layer energy absorber is compared to a known foam energy absorber via computer simulation. One of the predicted results is improved performance of the energy absorber where the layers have different impact strengths, as seen in paragraph [0060]:

[0060] Thus, a double layer conical structure comprised of 24 mm PS sheet being forced into a 19 mm PE sheet exhibits approximately 8% higher HIC(d) values than Strandfoam EA 1000, respectively. In addition, the data also demonstrates that forcing a weaker (e.g. taller) sheet into a stiffer (e.g. shorter) sheet improves normalized impact performance approximately 25% with the same weight. (Emphasis added).

This conclusion, combined with the teaching of paragraph [0041], teaches the benefits of a two layer energy absorber. Namely, that improved performance could be obtained by making the layers have different impact strengths. This teaching is not diminished because the example pertains explicitly to layers having different height surface features. The conclusion is clear that it pertains generally to situations where the layers have different impacts strengths, whether due to different materials, different surface feature heights, or different wall thicknesses (see paragraph [0040]).

Thus, even if the Examiner is permitted to shift the burden to the Applicants and require that the Applicants show the purpose of the claim element, Applicants have met the burden. In particular, Applicants have shown a benefit to differing materials in the energy absorber. Brockenbrough does not teach or suggest that any benefit from the use of layers having different impact strengths or other characteristics.

Further, the Examiner states that material selection is a matter of design choice. Even if the general supposition of the Examiner is true, the supposition does not apply here. In particular, claims 17 and 23 are not merely directed to a specific material (e.g. polypropylene) for use in an energy absorber. Rather, the claims 17 and 23 are directed to an energy absorber that comprises at least two layers with different materials. Thus, this is not the situation where a material selection is being made. Rather it is a situation where the relationship between two aspects of the claimed invention is being further defined. Namely, the composition of one layer is being distinguished from a second layer. For at least these reasons, the Examiner has failed to make a *prima facie* case of obviousness and withdrawal of the rejection is requested.

Claims 1, 28 and 29: Claims Including a Hinge

The Examiner also rejected claims 1, 28 and 29 as obvious over Brockenbrough.³ In this rejection, the Examiner fails to establish a *prima facie* case of obviousness by failing to identify where in the prior art each element of the claim is found. In particular, the Examiner fails to identify where in the prior art a 'hinge' is disclosed.

The Examiner never addresses the hinge element in the first Office Action or the Final Office Action even though the element is found in four different claims in the original claim set. The Examiner addresses the hinge element for the first time in the Advisory Action mailed September 28, 2005. In the Advisory Action, the Examiner states that: "Element 17 of Brockenbrough et al. can clearly be interpreted as a 'hinge'".

However, the Examiner's use of the word 'hinge' to describe element 17 is not warranted. A skilled artisan, after reviewing the specification of Brockenbrough, would not understand (much less interpret) the item denoted by reference numeral 17 to be the same or equivalent to a hinge. Indeed, a skilled artisan would understand reference numeral 17 to denote something that has the opposite functionality of a hinge.

The item at reference numeral 17 is described in Brockenbrough as:

a pair of brackets 17 (FIG. 1) and 18 (FIG. 2) for securing opposed narrow ends of the strips together. The brackets are secured to vertical posts of a vehicle door one of which is partially illustrated at 22 in FIG. 1. (column 3, line 1-5).

The brackets are further described as:

Brackets 17 and 18 are stiffer and generally thicker than the strips. Tabs 34 and 36 of each bracket are bent over as shown in FIG. 3a so as to secure the ends of the strips. (column 3, lines 35-38).

A bracket for securing together several components cannot be considered the same as a hinge. This rises to the level of an error in fact on the part of the Examiner.

This error in fact is compounded by the Examiner in the rejection of the method claims. The bracket 17 of Brockenbrough does not teach or suggest actuating a hinge to

³ Although the rejection was titled as based only on Brockenbrough, the body of the rejection mentions U.S. Patent No. 5,011,642 to Welygan. No mention of Welygan is made other than concerning extrusion.

manufacture an energy absorber (as in claim 28). Further, the bracket 17 of does not teach or suggest the extruding a layer of material with surface features separated by a hinge. As above, the bracket 17 conveys an opposite connotation to a skilled artisan then the one ascribed to it by the Examiner.

The same reasoning applies to the claims dependent from claim 1 and 29; namely claims 3-9 and claims 32 and 33, respectively. For at least these reasons, the Examiner has failed to make a *prima facie* case of obviousness and withdrawal of the rejection is requested.

Claims 7, 15 and 21: Claims Including the Use of Friction

The Examiner also rejected claims 7, 15 and 21 as obvious over Brockenbrough.⁴ In this rejection, the Examiner fails to establish a *prima facie* case of obviousness by failing to identify where in the prior art each element of the claim is found. In particular, the Examiner fails to identify where in the prior art where friction, as means of impact energy dissipation, is disclosed.

The Examiner never directly addresses the friction element in her rejection, thus making it difficult for the Applicants to respond. Again it appears that the Examiner is attempting to shift the burden to the Applicants, when in fact the Examiner has failed to meet her burden of identifying where in the prior art the use of friction to dissipate impact energy is disclosed.

Further, Applicants test for the effect of friction through a computer simulation by comparing energy absorbers that include a lubricant between the layers, as seen in paragraphs [0061] and [0062], and Table 2:

[0061] In another series of experimental tests, the effect of friction was investigated using CAE. Experimental tests on double layer conical structures with a 5 mm offset distance give the following results (utilizing structures such as seen in Fig. 3):

Table 2

Description	Comments	Total Thickness	HIC(d)
24 mm PS->24 mm PS	Control	29	510
24 mm PS->24 mm PS	Control	29	535
24 mm PS->24 mm PS	Lubricated cones	29	557
24 mm PS->24 mm PS	Lubricated cones	29	583

[0062] Thus, the data demonstrates that the frictional dissipation provided by a 5 millimeter offset improves head impact protection by approximately 10% versus similar samples with a lubricating agent.

⁴ Again, the rejection was titled as based only on Brockenbrough, but the body of the rejection mentions U.S. Patent No. 5,011,642 to Welygan. No mention of Welygan is made other than concerning extrusion.

Brockenbrough does not teach or suggest that any benefit from the use of friction to dissipate impact energy.

The same reasoning applies to the claims dependent from claim 7, 15 and 21; namely, claims 8, 16 and 22, respectively. For at least these reasons, the Examiner has failed to make a *prima facie* case of obviousness and withdrawal of the rejection is requested.

Conclusion

In view of Applicants' remarks, the Examiner's rejections are believed to contain clear error. Accordingly, Applicants submit that the present application contains allowable subject matter and is in condition for allowance. Should the Appeal Board or the Examiner have any question or wish to further discuss this application, Applicants request that the undersigned be contacted at (248) 292-2920.

If for some reason Applicants have not requested a sufficient extension and/or have not paid a sufficient fee for this response and/or for the extension necessary to prevent the abandonment of this application, please consider this as a request for an extension for the required time period and/or authorization to charge Deposit Account No. 04-1512 for any fee which may be due.

Date: February 27, 2006



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Claims Appendix

1. An article of manufacture, comprising:
an energy absorber comprising an extruded plastic first layer having a first plurality of corrugations separated by a hinge from a second plurality of corrugations, wherein the length of the corrugations are longer than their widest cross-sectional width.
2. (Canceled)
3. The article of claim 1, wherein individual corrugations of the first plurality are nested within individual corrugations of the second plurality after actuation of the hinge.
4. The article of claim 3, wherein the first and second pluralities of corrugations differ from each other in at least one structural or compositional aspect.
5. The article of claim 4, wherein the at least one structural aspect is selected from height, base width, floor width, average width, cross-sectional shape, base layer thickness, wall thickness, floor thickness and combinations thereof.
6. The article of claim 5, wherein cross-sectional shape is selected from square waveform, positive draft, negative draft, sinusoidal waveform, open loop shape, closed loop shape and combinations thereof.
7. The article of claim 5, wherein the differing structural aspect results in frictional energy dissipating during an impact.
8. The article of claim 7, wherein the differing structural aspect is depth.
9. The article of claim 4, wherein the first and second pluralities differ in composition.

10. An article of manufacture, comprising:
an energy absorber comprising an extruded plastic first layer having a first plurality of corrugations and an extruded plastic second layer having a second plurality of corrugations and wherein individual corrugations of the first plurality are nested within individual corrugations of the second plurality and wherein the first and second layers differ from each other in at least one structural or compositional aspect.
11. (Cancelled)
12. (Cancelled)
13. The article of claim 10, wherein the at least one structural aspect is selected from height, base width, floor width, average width, cross-sectional shape, base layer thickness, wall thickness, floor thickness and combinations thereof.
14. The article of claim 13, wherein cross-sectional shape is selected from square waveform, positive draft, negative draft, sinusoidal waveform, open loop shape, closed loop shape and combinations thereof.
15. The article of claim 13, wherein the differing structural aspect results in frictional energy dissipating during an impact.
16. The article of claim 15, wherein the differing structural aspect is depth.
17. The article of claim 12, wherein the first and second layers differ in composition.
18. An energy absorbing structure, comprising:
a energy absorber comprising a first plastic layer having a first plurality of surface features and a second plastic layer with a second plurality of surface features wherein the surface features of one layer are nested within the surface features of the other

layer and wherein the first and second layers differ from each other in at least one structural or compositional aspect.

19. The article of claim 18, wherein the at least one structural aspect is selected from height, base width, floor width, average width, cross-sectional shape, base layer thickness, wall thickness, floor thickness and combinations thereof.

20. The article of claim 19, wherein cross-sectional shape is selected from square waveform, positive draft, negative draft, sinusoidal waveform, open loop shape, closed loop shape and combinations thereof.

21. The article of claim 19, wherein the differing structural aspect results in frictional energy dissipating during an impact.

22. The article of claim 21, wherein the differing structural aspect is depth.

23. The article of claim 18, wherein the first and second layers differ in composition.

24. A method of manufacturing an energy absorber, comprising:
nesting individual surface features of a first plurality of surface features on a first plastic layer into individual surface features of a second plurality of surface features on a second plastic layer, wherein the first and second layers differ from each other in at least one structural or compositional aspect.

25. The method of claim 24, further comprising extruding a first layer comprising the first plurality of surface features.

26. The method of claim 25, further comprising extruding a second layer comprising the second plurality of surface features.

27. The method of claim 24, further comprising extruding a first layer comprising the first and second plurality of surface features.

28. The method of claim 27, wherein the nesting step comprises actuating a hinge that separates the first plurality and second plurality of surface features.

29. A method of manufacturing an energy absorber, comprising:
extruding a first layer comprising a first and a second plurality of surface features, wherein the first and second plurality of surface features are separated by a hinge.

30. (Cancelled)

31. (Cancelled)

32. The method of claim 29, further comprising nesting individual surface features of the first plurality of surface features into individual surface features of the second plurality of surface features.

33. The method of claim 32, wherein the first and second plurality of surface features are formed with at least one differing structural or compositional aspect.



Practitioner's Docket No. 1062-033 (63264)

PATENT

IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

In re application of: Myron J. Maurer

Application No.: 10/799,095

Group No.: 3683

Filed: March 12, 2003

Examiner: Torres, Melanie

For: IMPACT ABSORPTION STRUCTURE

Mail Stop Appeal Brief-Patents
Commissioner for Patents
P.O. Box 1450
Alexandria, VA 22313-1450

APPEAL BRIEF

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The Real Party in Interest

The application is assigned to Dow Global Technologies, Inc., which is a subsidiary of The Dow Chemical Company.

Related Appeals and Interferences

There are no other proceedings involving this application.

Status of Claims

Claims 1, 3-10, 13-29, 32 and 33 are rejected under 35 U.S.C. §103(a) as being unpatentable over U.S. Patent No. 4,852,704 to Brockenbrough et al. ("Brockenbrough").

Status of Amendments

Amendments submitted on September 12, 2005, after the final rejection, were entered.

A Request for Pre-Appeal Brief Review was submitted on December 12, 2005. The Review Panel decision was to proceed to the Board of Patent Appeals and Interferences in a notice mailed on January 30, 2006. The time period for filing this Appeal Brief was reset to one month from the mailing of the Notice i.e. February 28, 2006.

Summary of Claimed Subject Matter

The invention of claims 9, 17 and 23 is an article of manufacture or an energy absorbing structure with two layers of material. (paragraph [0012], second sentence; paragraph [0038], second sentence; and Figures 4A-4E, 5A and 5B). Each layer includes surface features such as protrusions or corrugations that nest within each other. (paragraph [0012], second sentence and paragraph [0013], first sentence). Extruded plastics may be used as the materials for each layer. (paragraph [0032], first sentence and (paragraph [0034], first sentence). The materials in the layers differ from one another in their composition. (paragraph [0038], second to last sentence; paragraph [0041]; and Figure 4B).

The invention of claim 1 is an article of manufacture with two pluralities of corrugations on a layer of material separated by a hinge. (paragraph [0052]; Figures 5A and 5B; and claims 2 and 3 as originally filed). The invention of claim 28 is a method of manufacturing an energy absorber which includes actuating a hinge that separates the two pluralities of surface features to nest the surface features within one another. (paragraph [0052], second sentence; claims 3 and 28 as originally filed; and Figure 5A and 5B). The invention of claim 29 is a method of manufacturing an energy absorber by extruding a layer of material with two pluralities of surface features separated by a hinge. (paragraph [0033], first sentence, paragraph [0052]; and claim 29 as originally filed).

The invention of claims 7, 15 and 21 is an article of manufacture or an energy absorbing structure that has frictional energy dissipation during an impact. (paragraph [0038], last sentence; paragraph [0039], last sentence; paragraphs [0043]-[0045]; and claims 7, 15 and 21 as originally filed).

Grounds of Rejection to be Reviewed on Appeal

Whether claims 17 and claim 23 are patentable under 35 U.S.C. §103 over Brockenbrough.

Whether claims 1, 28 and 29 are patentable under 35 U.S.C. §103 over Brockenbrough.

Whether claims 7, 15 and 21 are patentable under 35 U.S.C. §103 over Brockenbrough.



Argument

Rejection under 35 U.S.C. §103(a) over U.S. Patent No. 4,852,704 to Brockenbrough et al.

Claims 9, 17 and 23: Claims Including Two Different Materials

The Examiner rejected claims 17¹ and 23 as obvious over U.S. Patent No. 4,852,704 to Brockenbrough et al. ("Brockenbrough"). Claim 9 also contains this limitation but was not specifically rejected by the Examiner. In this rejection, the Examiner fails to establish a *prima facie* case of obviousness by failing to identify where in the prior art each element of the claim is found and by erroneously placing the burden on the Applicants.

The Examiner's rejection from page 3 of the Final Office Action is reproduced here:

Re claims 17, 23, 24-28, Brockenbrough et al. does not teach wherein the first and second layers differ in composition. It would have been obvious to one of ordinary skill in the art at the time of the invention was made to have provided the first and second layers of different composition since the applicant has not disclosed that having different compositions solves any stated problem or is for any particular purpose and it appears that the invention would perform equally well with a variety of different compositions such as metal or plastic.²

In response to Applicants' previous arguments regarding this rejection, the Examiner states on page 4 of the Final Office Action:

Further, it has been held that it is within the general skill of a worker in the art to select a known material on the basis of its suitability for the intended use as a matter of obvious design choice (In re Leshin, 125 USPQ 416).

This rejection fails to establish a *prima facie* case because the Examiner does not identify where in the prior art where each element of the claim is found. By the Examiner's own admission the cited prior art does not teach the use of differing compositions in the first and second layers of the article of manufacture (claim 17) or energy absorbing structure (claim 23).

The law is clear: a *prima facie* case of obviousness requires that the Examiner identify each and every element of the claimed invention in the prior art; failure to do so means that the Examiner has not made a *prima facie* case of obviousness. In re Royka, 490 F.2d 981, 180 USPQ 580 (CCPA 1974).

The Examiner attempts to rehabilitate the rejection by shifting the burden to the Applicants. The Examiner states that the Applicants have not disclosed that having different compositions in the energy absorber solves any stated problem or is for any

¹ Claim 17 currently depends on claim 12, a cancelled claim; the claim should depend from claim 10.

² This rejection was repeated from the first Office Action mailed on January 14, 2005.

particular purpose. However, the burden does not lie with the Applicants to provide such information because the Examiner has not shown where in the prior art that element of the claim is found. In re Oetiker, 977 F.2d 1443, 24 USPQ2d 1443 (Fed. Cir. 1992)(the examiner bears the initial burden, on review of the prior art or on any other ground, of presenting a *prima facie* case of obviousness).

Notwithstanding the error of the Examiner shifting the burden, the Applicants do state a benefit for the use layers having different compositions. First, as seen in paragraph [0041] of the application, Applicants disclose that in one embodiment, the layers may have different impact strengths as a result of the different materials used for the layers:

[0041] The second aspect of the multi-layer absorber with differing materials is shown in cross-section in Fig. 4B. Here, the first layer 220 includes corrugations 242 (or protrusions) into which are nested the corrugations 224 of the second layer 246 where the material of first corrugations differs from the material of the second corrugations. In this embodiment, the corrugations may be sized and shaped so that there is no appreciable space between the floors 228 and 230 of the two corrugations. The materials of the corrugations differ in their compositions and consequently their impact strength. In a preferred aspect, the first layer has a lower impact strength than the second layer. In a preferred embodiment, the differing materials of the corrugation may be combined with surface features having different structures e.g. different wall thickness. (emphasis added).

This is followed by an example where a two layer energy absorber is compared to a known foam energy absorber via computer simulation. One of the predicted results is improved performance of the energy absorber where the layers have different impact strengths, as seen in paragraph [0060]:

[0060] Thus, a double layer conical structure comprised of 24 mm PS sheet being forced into a 19 mm PE sheet exhibits approximately 8% higher HIC(d) values than Strandfoam EA 1000, respectively. In addition, the data also demonstrates that forcing a weaker (e.g. taller) sheet into a stiffer (e.g. shorter) sheet improves normalized impact performance approximately 25% with the same weight. (Emphasis added).

This conclusion, combined with the teaching of paragraph [0041], teaches the benefits of a two layer energy absorber. Namely, that improved performance could be obtained by making the layers have different impact strengths. This teaching is not diminished because the example pertains explicitly to layers having different height surface features. The conclusion is clear that it pertains generally to situations where the layers have different impacts strengths, whether due to different materials, different surface feature heights, or different wall thicknesses (see paragraph [0040]).

Thus, even if the Examiner is permitted to shift the burden to the Applicants and require that the Applicants show the purpose of the claim element, Applicants have met the burden. In particular, Applicants have shown a benefit to differing materials in the energy absorber. Brockenbrough does not teach or suggest that any benefit from the use of layers having different impact strengths or other characteristics.

Further, the Examiner states that material selection is a matter of design choice. Even if the general supposition of the Examiner is true, the supposition does not apply here. In particular, claims 17 and 23 are not merely directed to a specific material (e.g. polypropylene) for use in an energy absorber. Rather, the claims 17 and 23 are directed to an energy absorber that comprises at least two layers with different materials. Thus, this is not the situation where a material selection is being made. Rather it is a situation where the relationship between two aspects of the claimed invention is being further defined. Namely, the composition of one layer is being distinguished from a second layer. For at least these reasons, the Examiner has failed to make a *prima facie* case of obviousness and withdrawal of the rejection is requested.

Claims 1, 28 and 29: Claims Including a Hinge

The Examiner also rejected claims 1, 28 and 29 as obvious over Brockenbrough.³ In this rejection, the Examiner fails to establish a *prima facie* case of obviousness by failing to identify where in the prior art each element of the claim is found. In particular, the Examiner fails to identify where in the prior art a 'hinge' is disclosed.

The Examiner never addresses the hinge element in the first Office Action or the Final Office Action even though the element is found in four different claims in the original claim set. The Examiner addresses the hinge element for the first time in the Advisory Action mailed September 28, 2005. In the Advisory Action, the Examiner states that: "Element 17 of Brockenbrough et al. can clearly be interpreted as a 'hinge'".

However, the Examiner's use of the word 'hinge' to describe element 17 is not warranted. A skilled artisan, after reviewing the specification of Brockenbrough, would not understand (much less interpret) the item denoted by reference numeral 17 to be the same or equivalent to a hinge. Indeed, a skilled artisan would understand reference numeral 17 to denote something that has the opposite functionality of a hinge.

The item at reference numeral 17 is described in Brockenbrough as:

a pair of brackets 17 (FIG. 1) and 18 (FIG. 2) for securing opposed narrow ends of the strips together. The brackets are secured to vertical posts of a vehicle door one of which is partially illustrated at 22 in FIG. 1. (column 3, line 1-5).

The brackets are further described as:

Brackets 17 and 18 are stiffer and generally thicker than the strips. Tabs 34 and 36 of each bracket are bent over as shown in FIG. 3a so as to secure the ends of the strips. (column 3, lines 35-38).

A bracket for securing together several components cannot be considered the same as a hinge. This rises to the level of an error in fact on the part of the Examiner.

This error in fact is compounded by the Examiner in the rejection of the method claims. The bracket 17 of Brockenbrough does not teach or suggest actuating a hinge to

³ Although the rejection was titled as based only on Brockenbrough, the body of the rejection mentions U.S. Patent No. 5,011,642 to Welygan. No mention of Welygan is made other than concerning extrusion.

manufacture an energy absorber (as in claim 28). Further, the bracket 17 of does not teach or suggest the extruding a layer of material with surface features separated by a hinge. As above, the bracket 17 conveys an opposite connotation to a skilled artisan then the one ascribed to it by the Examiner.

The same reasoning applies to the claims dependent from claim 1 and 29; namely claims 3-9 and claims 32 and 33, respectively. For at least these reasons, the Examiner has failed to make a *prima facie* case of obviousness and withdrawal of the rejection is requested.

Claims 7, 15 and 21: Claims Including the Use of Friction

The Examiner also rejected claims 7, 15 and 21 as obvious over Brockenbrough.⁴ In this rejection, the Examiner fails to establish a *prima facie* case of obviousness by failing to identify where in the prior art each element of the claim is found. In particular, the Examiner fails to identify where in the prior art where friction, as means of impact energy dissipation, is disclosed.

The Examiner never directly addresses the friction element in her rejection, thus making it difficult for the Applicants to respond. Again it appears that the Examiner is attempting to shift the burden to the Applicants, when in fact the Examiner has failed to meet her burden of identifying where in the prior art the use of friction to dissipate impact energy is disclosed.

Further, Applicants test for the effect of friction through a computer simulation by comparing energy absorbers that include a lubricant between the layers, as seen in paragraphs [0061] and [0062], and Table 2:

[0061] In another series of experimental tests, the effect of friction was investigated using CAE. Experimental tests on double layer conical structures with a 5 mm offset distance give the following results (utilizing structures such as seen in Fig. 3):

Table 2

Description	Comments	Total Thickness	HIC(d)
24 mm PS->24 mm PS	Control	29	510
24 mm PS->24 mm PS	Control	29	535
24 mm PS->24 mm PS	Lubricated cones	29	557
24 mm PS->24 mm PS	Lubricated cones	29	583

[0062] Thus, the data demonstrates that the frictional dissipation provided by a 5 millimeter offset improves head impact protection by approximately 10% versus similar samples with a lubricating agent.

⁴ Again, the rejection was titled as based only on Brockenbrough, but the body of the rejection mentions U.S. Patent No. 5,011,642 to Welygan. No mention of Welygan is made other than concerning extrusion.

Brockenbrough does not teach or suggest that any benefit from the use of friction to dissipate impact energy.

The same reasoning applies to the claims dependent from claim 7, 15 and 21; namely, claims 8, 16 and 22, respectively. For at least these reasons, the Examiner has failed to make a *prima facie* case of obviousness and withdrawal of the rejection is requested.

Conclusion

In view of Applicants' remarks, the Examiner's rejections are believed to contain clear error. Accordingly, Applicants submit that the present application contains allowable subject matter and is in condition for allowance. Should the Appeal Board or the Examiner have any question or wish to further discuss this application, Applicants request that the undersigned be contacted at (248) 292-2920.

If for some reason Applicants have not requested a sufficient extension and/or have not paid a sufficient fee for this response and/or for the extension necessary to prevent the abandonment of this application, please consider this as a request for an extension for the required time period and/or authorization to charge Deposit Account No. 04-1512 for any fee which may be due.

Date: February 27, 2006



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Claims Appendix

1. An article of manufacture, comprising:
an energy absorber comprising an extruded plastic first layer having a first plurality of corrugations separated by a hinge from a second plurality of corrugations, wherein the length of the corrugations are longer than their widest cross-sectional width.
2. (Canceled)
3. The article of claim 1, wherein individual corrugations of the first plurality are nested within individual corrugations of the second plurality after actuation of the hinge.
4. The article of claim 3, wherein the first and second pluralities of corrugations differ from each other in at least one structural or compositional aspect.
5. The article of claim 4, wherein the at least one structural aspect is selected from height, base width, floor width, average width, cross-sectional shape, base layer thickness, wall thickness, floor thickness and combinations thereof.
6. The article of claim 5, wherein cross-sectional shape is selected from square waveform, positive draft, negative draft, sinusoidal waveform, open loop shape, closed loop shape and combinations thereof.
7. The article of claim 5, wherein the differing structural aspect results in frictional energy dissipating during an impact.
8. The article of claim 7, wherein the differing structural aspect is depth.
9. The article of claim 4, wherein the first and second pluralities differ in composition.

10. An article of manufacture, comprising:
an energy absorber comprising an extruded plastic first layer having a first plurality of corrugations and an extruded plastic second layer having a second plurality of corrugations and wherein individual corrugations of the first plurality are nested within individual corrugations of the second plurality and wherein the first and second layers differ from each other in at least one structural or compositional aspect.
11. (Cancelled)
12. (Cancelled)
13. The article of claim 10, wherein the at least one structural aspect is selected from height, base width, floor width, average width, cross-sectional shape, base layer thickness, wall thickness, floor thickness and combinations thereof.
14. The article of claim 13, wherein cross-sectional shape is selected from square waveform, positive draft, negative draft, sinusoidal waveform, open loop shape, closed loop shape and combinations thereof.
15. The article of claim 13, wherein the differing structural aspect results in frictional energy dissipating during an impact.
16. The article of claim 15, wherein the differing structural aspect is depth.
17. The article of claim 12, wherein the first and second layers differ in composition.
18. An energy absorbing structure, comprising:
a energy absorber comprising a first plastic layer having a first plurality of surface features and a second plastic layer with a second plurality of surface features wherein the surface features of one layer are nested within the surface features of the other

layer and wherein the first and second layers differ from each other in at least one structural or compositional aspect.

19. The article of claim 18, wherein the at least one structural aspect is selected from height, base width, floor width, average width, cross-sectional shape, base layer thickness, wall thickness, floor thickness and combinations thereof.

20. The article of claim 19, wherein cross-sectional shape is selected from square waveform, positive draft, negative draft, sinusoidal waveform, open loop shape, closed loop shape and combinations thereof.

21. The article of claim 19, wherein the differing structural aspect results in frictional energy dissipating during an impact.

22. The article of claim 21, wherein the differing structural aspect is depth.

23. The article of claim 18, wherein the first and second layers differ in composition.

24. A method of manufacturing an energy absorber, comprising:
nesting individual surface features of a first plurality of surface features on a first plastic layer into individual surface features of a second plurality of surface features on a second plastic layer, wherein the first and second layers differ from each other in at least one structural or compositional aspect.

25. The method of claim 24, further comprising extruding a first layer comprising the first plurality of surface features.

26. The method of claim 25, further comprising extruding a second layer comprising the second plurality of surface features.

27. The method of claim 24, further comprising extruding a first layer comprising the first and second plurality of surface features.

28. The method of claim 27, wherein the nesting step comprises actuating a hinge that separates the first plurality and second plurality of surface features.

29. A method of manufacturing an energy absorber, comprising:
extruding a first layer comprising a first and a second plurality of surface features, wherein the first and second plurality of surface features are separated by a hinge.

30. (Cancelled)

31. (Cancelled)

32. The method of claim 29, further comprising nesting individual surface features of the first plurality of surface features into individual surface features of the second plurality of surface features.

33. The method of claim 32, wherein the first and second plurality of surface features are formed with at least one differing structural or compositional aspect.